CLAIMS

1. Method for limiting the maintenance loads applied to a fuel assembly (1) of a nuclear reactor in order to compensate for the hydraulic thrust of cooling water passing through the fuel assembly (1) during operation in the nuclear reactor, the fuel assembly comprising a framework which contains a cluster of fuel rods (5) parallel with each other and which is closed at its ends by transverse end-pieces (7, 8) which are perpendicular to the longitudinal direction of the fuel assembly (1) in which the cooling water flows, each of the end-pieces (7, 8) comprising at least two axial centering through-holes (10, 12) which are intended each to receive a centering pin (11, 13) of a lower core support plate (2) or an upper core plate (3), characterised in that there is constructed a resilient bush (15) for frictionally engaging a centering pin (11, 13), for at least one centering hole, of at least one of the end-pieces (7, 8) of the fuel assembly (1), the resilient bush comprising an annular member having a fixing portion (15a) whose outer diameter is at a maximum and at least equal to the diameter of the centering hole (10, 12, 18) of the end-piece (7, 8), over a portion of the axial length thereof, at least two flexible arms (16) which are separated from each other by at least two apertures (17) of axial direction over the entire length of the resilient bush (15) between the fixing portion (15a) thereof and a free end of the bush (15), the portion of the bush comprising the flexible arms (16) having an outer diameter smaller than the diameter of the centering hole and an annular supporting surface (19) which projects radially inside the bush (15) in the free end portion of the flexible arms (16) whose inner diameter is smaller than the diameter of the centering pins (11, 13), in that the hole (10, 12, 18) of the at least one end-piece (8,

9) of the fuel assembly (1) is constructed so as to have a diameter which is substantially equal to the outer diameter of the fixing portion (15a) of the resilient bush, and in that a resilient bush (15) is fixed in the hole of the at least one end-piece (7, 8).

2. Method according to claim 1, characterised in that the resilient bush (15) is fixed in the hole (10, 12) of the end-piece (7, 8) of the fuel assembly by at least one of the following methods: crimping, expansion-rolling, welding, screwing.

3. Method according to claim 1, characterised in that resilient bushes (15) are fixed in the through-holes (10, 12, 18) of only one of the end-pieces (7, 8) of the fuel assembly and preferably in the through-holes (10, 18) of the bottom end-piece (7).

4. Method according to either claim 1 or claim 2, characterised in that resilient bushes (15) are fixed in the through-holes of each of the top (8) and bottom (9) end-pieces of the fuel assembly.

5. Method according to any one of claims 1 to 4, characterised in that resilient bushes are constructed whose inner diameter (DI) is greater than the diameter of a cylindrical engaging portion of the centering pins (11, 13) in order to take into consideration tolerances with respect to the diameter of the cylindrical engaging portion of the centering pin and the spacing between the centering pins which are intended to be engaged in the end-piece of a fuel assembly.

6. Method according to any one of claims 1 to 5, characterised in that there are provided supporting surfaces of elliptical form and supporting surfaces of circular form for contact with the centering pin (11, 13) at the annular supporting surface (19) inside the bush (15), in order to optimise contact and friction of a centering pin (11, 13) with the supporting portion (19) of the resilient bush (15) during displacements of the fuel assembly in the vertical direction under the action of the hydraulic thrust.

7. Fuel assembly of a nuclear reactor comprising a framework which contains a cluster of fuel rods (5) parallel with each other and which is closed at its ends by transverse end-pieces (8, 9) which are perpendicular to the longitudinal direction of the fuel assembly (1) in which the cooling water flows, each of the end-pieces (7, 8) comprising at least two axial through-holes (10, 12, 18) which are intended each to receive a centering pin (11, 13) of a lower core plate (2) or an upper core plate (3), characterised in that there is fixed, inside at least one through-hole (10, 12) of at least one of the end-pieces (7, 8) of the fuel assembly (1), a resilient bush (15) which comprises an annular member which has a fixing portion (15a) whose outer diameter is at a maximum and at least equal to the diameter of the through-hole (10, 12) over a portion of the axial length thereof, at least two flexible arms (16) which are separated from each other by at least two apertures (17) of axial direction over the entire length of the bush (15) between the fixing portion (15a) and a free end of the bush, having an outer diameter which is smaller than the diameter of the fixing portion (15a) and an annular supporting surface (19) which projects radially inside the bush (15) in a free end portion of the flexible arms (16) whose inner diameter is smaller than the diameter of the

centering pins (11, 13) which are intended to be introduced in the holes of the end-piece.

8. Fuel assembly according to claim 7, characterised in that the through-holes (10, 12, 18) of the end-piece of the fuel assembly in which a resilient bush (15) is fixed have a diameter which is substantially greater than the diameter of the centering pins (11, 13), the diameter of the through-holes being determined by the following equation: DD = DB + DI - DC, where DD is the hole diameter of the through-hole (18) of the end-piece (7), DI is an inner diameter of the flow portion of the resilient bush (15), DB is the outer diameter of the flexible arms (16) of the bush (15) and DC is the diameter of the internal supporting portion of the resilient arms (16) of the bush (15).

9. Fuel assembly according to claim 7, characterised in that the inner diameter (DI) of the flow portion of the resilient bush (15) is greater than the diameter of a centering pin (11, 13) in order to take into consideration the tolerances with respect to the diameter of the centering pins and the spacing of the centering pins (11, 13) which are intended to be introduced in the end-piece (8, 9) of the fuel assembly.